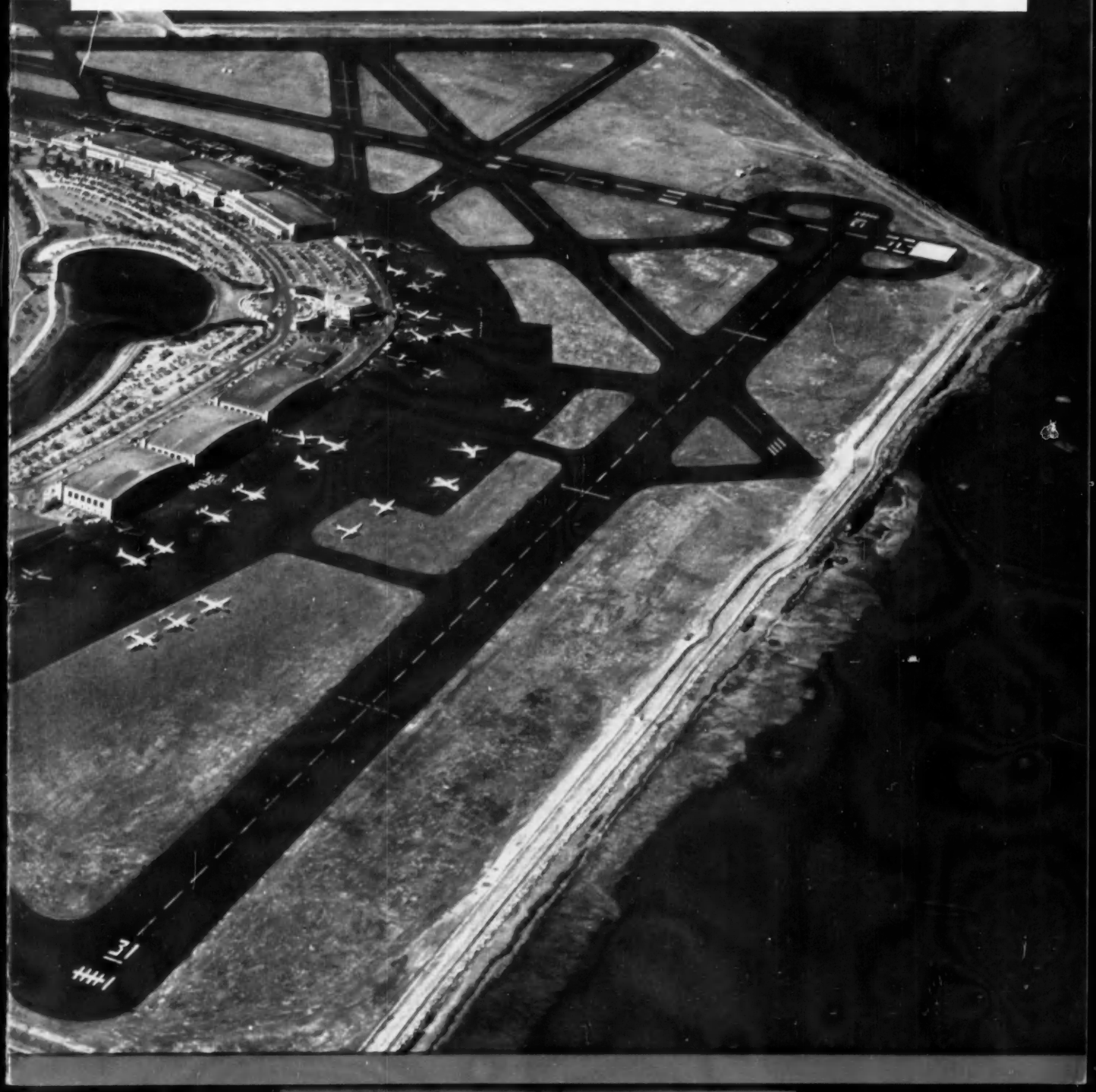
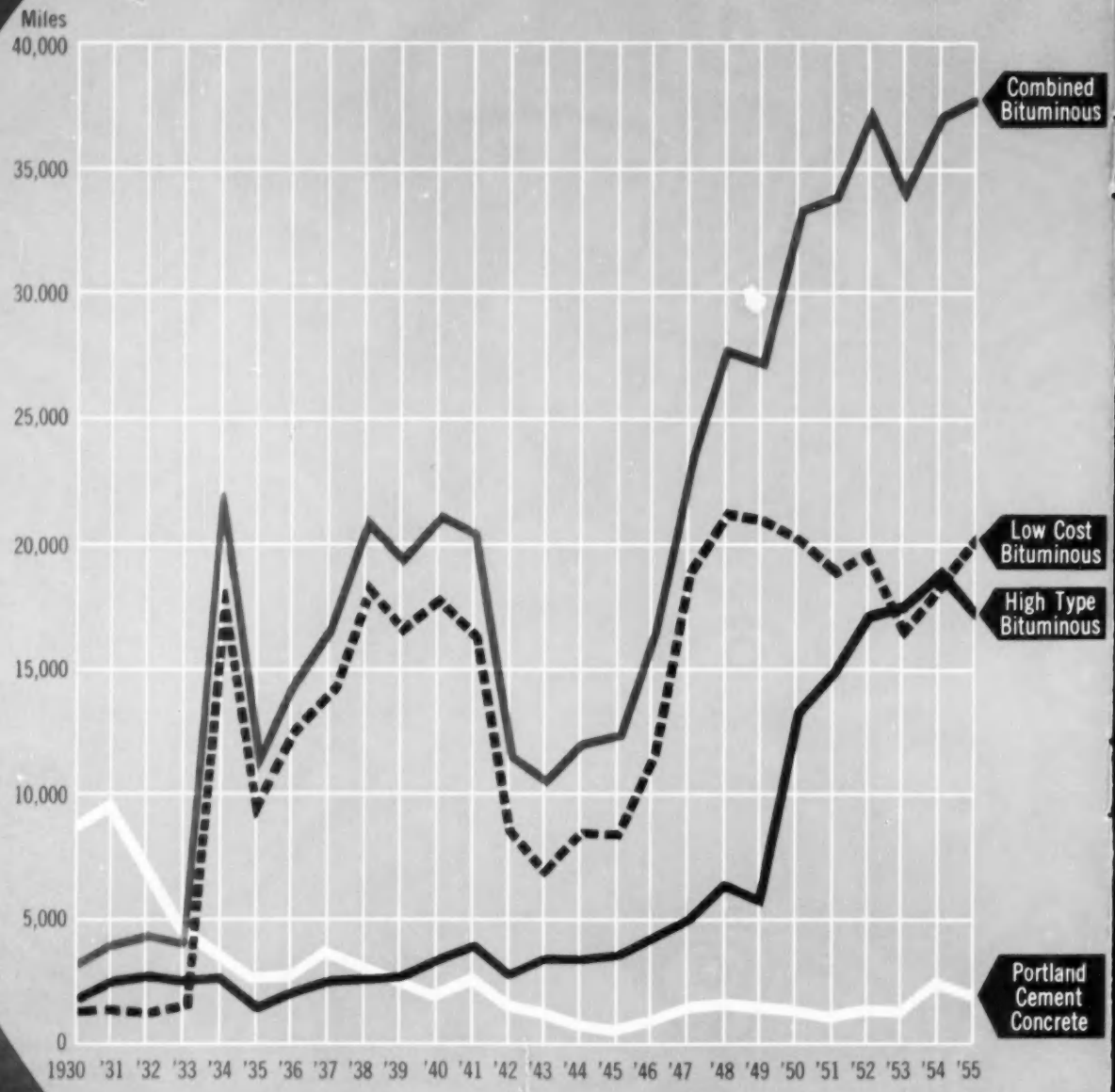
ASPHALT INSTITUTE *Quarterly*

APRIL, 1957



Mileage Built Annually By State Highway Departments



IN 1955, 95% OF ALL SURFACED MILEAGE CONSTRUCTED BY STATE HIGHWAY DEPARTMENTS WAS PAVED WITH ASPHALT

Source: U.S. Bureau of Public Roads

CHARTED BY THE ASPHALT INSTITUTE

The Ever-Smooth Highway

BEFORE construction of the Interstate Highway System reaches the paving stage, it is well to review current maintenance procedures and appraise their adequacy for this huge development. At some time after completion, of course, these great highways will require repair and improvement. When this need arises, it will be neither tolerable nor practicable to detour traffic or even to close one side of a highway for an appreciable length of time for repairs. Traffic volume ten years hence will be so much heavier than it is today that re-routing will result in untold confusion and loss. This means, then, that the pavement surface of these super-highways must be such that renewal can be accomplished with little or no interference to continuous use. The question is, how best can this be done?

It is illuminating to regard the experience of the railroads. While highway improvement has been more or less piecemeal over the years, railroad tracks have been maintained in a largely stabilized condition. There are two outstanding reasons for this. First, most railroad-beds are constructed almost entirely as continuous embankments, insuring adequate drainage in all seasons. Second, the track structure is of flexible design consisting of a layer of crushed rock, wooden cross-ties, and steel rails. To keep the track in top, smooth-riding condition, the railroads have found it practicable to "reface" the track periodically or, in other words, to readjust the rail level to required smoothness. In some sections this readjustment may be needed every six months; in others it may be required only at intervals of several years. It is a procedure which has insured safety, maximum utility, and lowest possible cost of maintaining expensive rolling stock.

We should apply this experience in building the Interstate Highway System. With all our knowledge of soil mechanics—with magnificent equipment working without interruption on new rights-of-way—there can be no excuse for not producing adequately drained subgrades having the highest support value. As a greater variety of foundation materials, such as limerocks, gravels, sands and shales, can be employed in highway construction than in railroad building, it is easily possible to build excellent foundations over these superlative subgrades which in themselves are capable of supporting the heaviest loads. All that is further required is a pavement that will resist surface moisture and abrasion. It need be only a few inches thick, provided it is a type that can be "refaced"—i.e., brought back to required smoothness with thin resurfacing.

Claims are made for pavements that will last 50 years. Doubtless there are several types that might do so, but in what condition? Under the tremendous traffic of tomorrow, there is no pavement that will last even 20 years without becoming distorted in some degree. Abrupt variations of even one-half inch will be objectionable. The pavement to select, then, is one on which these variations can be easily corrected, a lane at a time, through the addition of thin, mechanically-spread pavement layers that become an integral part of the existing pavement and which will permit opening the road to traffic immediately after placement. Such a pavement, with this method of maintenance, will be kept continuously smooth, free from joints, and will cost the least. Moreover, at the end of 50 years, or 100, it will be better and stronger than when originally built.

That pavement is asphalt.

—BERNARD E. GRAY

ASPHALT PAVES OUR FINEST HIGHWAYS

ASPHALT INSTITUTE Quarterly

Vol. 9, No. 2, April, 1957

EDITOR
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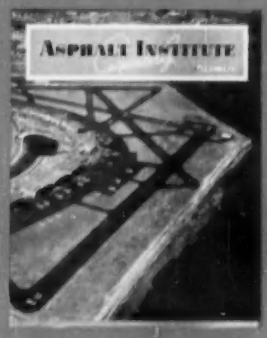
Cover

This famed airport is La Guardia Field, the nation's second busiest civil airfield serving its biggest metropolis, New York City. Of the ten leading airports in the U.S., seven, including La Guardia, are asphalt-paved. They are described in this issue of the Quarterly in an article beginning on page 6.

Photo: Fairchild Aerial Surveys, Inc.



The Asphalt Institute Quarterly is published by The Asphalt Institute, an international, nonprofit association sponsored by members of the asphalt industry to serve both users and producers of asphaltic materials through programs of engineering, research and education.

The Member Companies of the Institute, who have made possible the publication of this magazine, are listed on page 15.

Articles may be reprinted with credit line. Correspondence should be addressed to the Asphalt Institute Quarterly, Asphalt Institute Building, University of Maryland, College Park, Maryland.

BERTRAM D. TALLAMY
Federal Highway Administrator

JOHN A. VOLPE
Interim Appointee as Federal Highway Administrator

A Salute to the Federal Highway Administrator

Now that the great new highway program under the Federal-Aid Highway Act of 1956 is well underway, the *Quarterly* is privileged to pay special recognition to the Federal Highway Administrator who heads this gigantic operation. Specifically we take note of two outstanding gentlemen: Bertram D. Tallamy, who now holds this important post, and John A. Volpe, who served as interim appointee for three months before Mr. Tallamy took office.

During his brief tenure, Mr. Volpe performed the mighty job of putting in motion this huge undertaking—the greatest public works program in world history. For his excellent work in planning and implementing its initial phases, we extend to him our highest praise and commendation.

In welcoming Mr. Tallamy to his new position, we pay him tribute for his noteworthy achievements of the past, confident in the belief that his amply proven administrative abilities and leadership, together with the indispensable aid furnished by Commissioner C. D. Curtiss and his staff of the Bureau of Public Roads, will guide our nation resolutely, wisely and unerringly along the road toward completion of the immense task at hand.

C. D. CURTISS
Commissioner
U. S. Bureau of Public Roads

In an address before the 42nd Annual Convention of the American Association of State Highway Officials at Atlantic City, New Jersey, November 27, 1956, John A. Volpe, interim appointee as Federal Highway Administrator, sounded a realistic warning that echoes in praiseworthy fashion the concern of several well-known highway officials and engineering authorities charged with the tremendous responsibility of fulfilling the requirements of the Federal-Aid Highway Act of 1956.

The 90% Federal-Aid called for by the Act, he stated, might provide a temptation to neglect economy in building the Interstate Highway System.

In making his remarks, Volpe exhibited recognition of a dangerous situation inherent in such a mammoth, multi-billion dollar undertaking. The program has a thirteen-year target date. Will this be met, or will we arrive at the 1970 date with the billions of dollars prescribed for this construction all spent and the job half done? Volpe packaged the problem in this statement:

> "A . . . danger which I foresee lies in the fact that Federal funds will make up about 90 percent of the cost of the Interstate System. Here the temptation may be to overbuild, to provide more costly structures than are required . . . I am not suggesting that this tendency will be universal, or even widespread, but the risk is obvious.
>
> ". . . The pitfalls I have mentioned must be avoided. Not only because they violate sound principles of highway practice but also because they will invite justified criticisms from many sources—including the Congress."

There can be no mistaking the significance of these words. The U.S. Bureau of Public Roads is currently compiling the states' re-estimate of cost of building the National System of Interstate and Defense Highways. Indications are that the new estimate will show a much higher figure than the one on which the Federal-Aid Highway Act of 1956 was based—possibly 60 percent greater. Many states, finding themselves hard-put to raise the cash required to match the 90 percent Federal-Aid appropriation, are now levying or seeking to impose additional taxes on gasoline, truck tires and other high-

In Constructing the Interstate Highway System.....

90% Federal Aid—A temptation to neglect economy

way-user items. Some states are facing the necessity of borrowing the money.

The average American motorist now pays about $9 a year in gasoline taxes to the Federal government to provide its portion of the funds needed for highway construction under the new Act. This is not an intolerable burden to the average car owner. If, however, state gas taxes continue to rise to meet increasing construction costs—if tax dollars are consumed while actual construction progress lags far behind schedule—the American motorist is certain to take a seriously dim view of the once-shining picture of a network of super-highways lacing the country. Such a development could only result in a decidedly unpleasant jolt to the American economy.

ROADS DESPERATELY NEEDED

America needs these roads . . . needs them badly. So fundamental is an adequate system of good roads to our continuing economic development, to the defense of our country and to our social welfare that failure to complete the program within a reasonable period of time is unthinkable. Consequently, every individual has a responsibility to see that this vital network of highways is achieved and that it is built in accordance with the highest engineering standards without extravagant spending of the taxpayer's money.

All of which leads to these obvious questions: How and where can economies be effected? How can the drain on the taxpayer's pocketbook be minimized? How can soaring state gasoline taxes be curbed or the possibility of further federal gas taxes precluded?

Administrator Volpe hinted at one of the areas where economy might be achieved when he cautioned against overbuilding. Road paving, for example, is an item where considerable savings can be realized through prudent selection of the most economical pavement type available. One well-known highway expert, on the basis of facts about the new program available soon after publication of the original estimate, figured that savings of several billion dollars could be achieved if the 41,000-mile Interstate System were paved with heavy-duty, hot-mix asphalt.

ASPHALT CAN RELIEVE MOUNTING COSTS

Modern asphalt paving can contribute materially to the relief of mounting construction costs. It can show a saving in first cost of *twenty to fifty percent* over comparable designs of rigid slab pavement built to serve the same heavy traffic. Its performance on many of America's greatest superhighways and its preference by the vast majority of highway engineers for heavy-duty construction clearly establish asphalt as the leader among all paving materials. And, regarding a matter that has provoked considerable controversy, there exists ample documentation to prove that maintenance of heavy-duty asphalt pavements is *low*—that it certainly costs *no more to maintain* than slab pavement and often much less.

Billions of dollars can be saved by using asphalt to pave the modern roads we need. Furthermore, asphalt paving will get them for us faster. With a thirteen-year target date to be met and with Congress exerting pressure to show progress in executing the highway program, construction speed becomes a matter of vital necessity.

ASPHALT IN AMPLE SUPPLY

Currently there are rumors of shortages of some construction materials, a development that could impede well-laid plans to expedite the program. Some delays already are occurring because of these shortages. On the other hand, asphalt, as the Board of Directors of The Asphalt Institute reiterated at their annual meeting last December, is in plentiful supply.

The use of asphalt paving can help conserve our construction materials supply. It will save money and it will save construction time. The greater speed and ease of asphalt paving are well-known advantages proven by experience and fully documented beyond dispute.

Yes, there is a way to help cut rising construction costs, to bring the road program within the bounds of economy and frugal spending. We need the new and better roads the Federal-Aid Act calls for. Asphalt paving will get them for us quicker and at least cost.

Above: Passengers boarding Capital Airlines turbo-prop from asphalt apron at Washington National Airport. Below: America's first all-jet transport, the Boeing 707, recently completed a flight from Seattle to Baltimore's asphalt-paved Friendship International Airport in 3 hours, 48 minutes. The giant liner, still being tested, has a normal cruising speed of 550 mph. Gross weight is 190,000 lbs.; length, 128 ft.; tail height, 38 ft. 3 in. Landing gear is the dual-tandem type, with load of 114,000 lbs.; tire pressure 120 psi; tire loading 28,500 lbs.

Photos: Capital Airlines, Boeing Airplane Company

ASPHALT
Paves Seven of Nation's Ten Leading Airports

Modern asphalt pavement has posted an enviable record in the construction of streets, highways and airfields. Its mileage leadership on the nation's roads is indisputable, as U.S. Bureau of Public Roads statistics attest, year after year. A glance at the chart on page two of this magazine will reveal that state highway departments annually build more asphalt pavement, both heavy-duty and low-cost, than any other kind.

There are, of course, good reasons for this. First, heavy-duty asphalt pavement is a truly modern pavement, the only really up-to-date pavement available to engineers for constructing the modern highways today's heavy traffic requires. It is smoother than any other pavement. It is stronger. It is easier, faster and far less costly to construct. Maintenance is low cost—certainly no more than for other pavement types—and can be accomplished with much greater speed and facility.

A second major reason why engineers overwhelmingly prefer asphalt pavement is its versatility. It is this quality, inherent in asphaltic materials, which makes asphalt paving the only practical means for improving old, obsolete roads regardless of the type of existing pavement. In other words, it can not only economically rejuvenate, strengthen and widen old asphalt roads showing distress under traffic they were never designed to carry, but it can also be used to salvage deteriorating slab-type highways by economical undersealing, widening and resurfacing.

ASPHALT LEADS IN AIRFIELD PAVING

In airfield paving as in road construction, asphalt holds a commanding lead. Its preference by airport officials and engineers stems from proven performance based on the advantages cited above. With air traffic continually increasing (CAA statistics for 1956 show a 9% increase in total operations over 1955 and an incredible 54% over 1951) and the commercial airlines putting into service bigger, heavier and faster planes, many major civil airports have not only enlarged their field area and passenger facilities but have also scheduled programs for improvement and strengthening of runways and taxiways rapidly becoming obsolete. Almost without exception airfield engineers have picked asphalt paving to accomplish the latter task.

Obviously, the need to perform airfield pavement stage construction and maintenance with dispatch is a vital one. A runway or taxiway put out of commission for repairs even for a few days could seriously disrupt the efficiency of airport traffic operations. With asphalt paving, maintenance repairs and improvements can be carried out rapidly and easily—day and night—from minor patching to total resurfacing. Once the new paving is placed, the airstrip can be opened to traffic within a few hours, since no long curing period is required.

WARTIME PAVING PROVIDES PROOF

This important advantage of asphalt paving—speed and ease of construction and maintenance—was put to the test and fully proven at many of our military airbases built during World War II in captured enemy territory in the Pacific and China-Burma-India Theatres. With speed of the essence in establishing these outposts for safe, efficient landings and takeoffs by U.S. fighters and bombers, Army and Navy construction battalions paved the runways with asphalt that had been barreled and sometimes flown to the site by transport planes. Often employing thousands of native laborers, these tremendous surfacing projects, providing smooth, durable all-weather runway pavements, were performed and placed in service in a matter of days. Only with asphalt could the job have been done in so short a time.

SUPERIOR IN ALL RESPECTS

Asphalt paving has long played a significant role in the evolution and development of aviation. When the grass landing strip became obsolete under the loads of bigger, heavier planes, asphalt provided the economical hard-surfaced pavement they demanded. It has been an indispensable part of the airfield paving picture ever since. So highly regarded are its superior qualities of smoothness, durability and long life, its economy of construction and maintenance, and its extreme utility in strengthening and improving old airfield pavements of any type, that **seven of the ten leading civil airfields in the United States with respect to number of takeoffs and landings are asphalt paved.**

The following pages describe these seven fine airports, all of which daily play host to hundreds of our most modern commercial aircraft. Airport engineers can take pride in the knowledge that the heavy-duty asphalt pavement is as modern as the aircraft it serves.

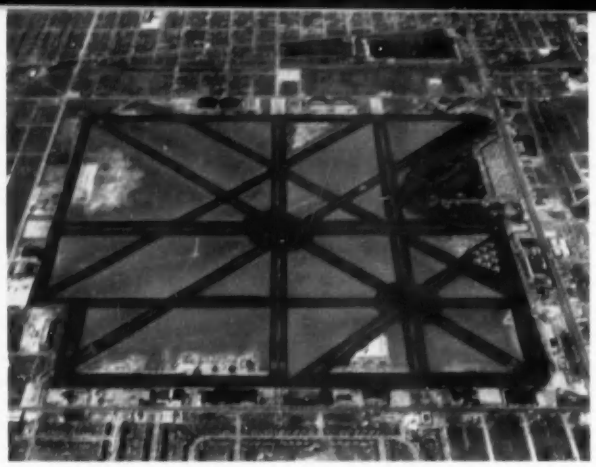


Photo: Chicago Aerial Industries, Inc.

CHICAGO MIDWAY AIRPORT

Chicago Midway is the busiest airport in the United States. During fiscal year 1956, according to the Civil Aeronautics Administration, the number of aircraft operations excluding purely local flights amounted to 366,079, exceeding by over 100,000 the number of takeoffs and landings recorded at the second-ranking airport, New York's LaGuardia. Since 1927, when Midway was opened, the number of plane movements has totalled well over 4,500,000. During its 28-year life the airport has served nearly 67 million passengers.

To handle increasing traffic volumes and aircraft weights through the years, Midway engineers have effected a number of programs of expansion and improvement of facilities. In April 1941, the field was doubled in area by linking its north and south halves. This increased the length of all taxiways and runways, the longest of which is now 6410 feet overall, for greater safety and maneuverability.

Although periodic asphalt stage construction has been carried out for many years at Midway to accommodate additional plane weights and landing weights as required for operations, the first major resurfacing program went into effect in 1948 when approximately 133,000 tons of heavy-duty asphalt pavement were applied to all eight taxiways and runways. Additional thickening and strengthening of runways with asphalt has occurred during the period 1948 to 1956 at the rate of approximately 4000 tons a year.

This year, 1957, airport authorities are overlaying two taxiways with 2½" of asphalt hot-mix, increasing their load-bearing capacity to accommodate the new, heavier DC-7's and turbo-props.

NEW YORK's LAGUARDIA AIRPORT

The nation's second busiest civil airfield is LaGuardia Airport, located at the entrance of Flushing Bay in the Borough of Queens, New York City. Criss-crossing the field are four asphalt runways, one of which is closed to flight operations.

The Flushing Bay area is noted for the unstable nature of its subgrade soils, a condition which dictated use of a flexible surfacing material at LaGuardia. The inherent flexibility and resiliency of asphalt paving is one of its chief advantages, one that enables it to "give" when the earth beneath it subsides. This feature contrasts with the brittleness of rigid pavement which bridges over depressed areas in the subgrade and eventually, under pounding by traffic, cracks and breaks up. When this occurs the only solution is to underseal the slabs with liquid asphalt and resurface them with heavy-duty asphalt pavement. LaGuardia's engineers, therefore, decided to build the runways with asphalt in the first place. They completed the project in 1936.

The extreme settling condition at LaGuardia, coupled with tremendous step-ups in aircraft operations and increased aircraft loads, have prompted airport engineers to perform extensive resurfacing operations over the years. Asphalt, of course, has been used in all improvements, thickening the runways for increased strength. Pounded by the tremendous loads of over 260,000 aircraft in 1956, LaGuardia's asphalt pavements are adequately carrying the world's biggest and heaviest commercial planes.

Photo: Fairchild Aerial Surveys

Photo: Fairchild Aerial Surveys

WASHINGTON NATIONAL AIRPORT

Located at Gravelly Point, Virginia, on the west bank of the Potomac River five miles south of the nation's capital, is Washington National Airport. The field was built approximately sixteen years ago on hydraulic fill excavated from the river. Its four asphalt runways served some 237,000 aircraft in 1956.

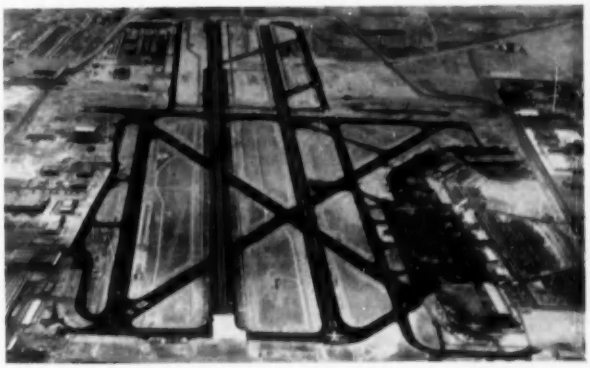
The runways consist of 1½" of asphaltic concrete surface over a 2" asphaltic concrete base. A sub-base of mechanically stabilized sand-gravel supports these pavement layers. This relatively thin structure is one of the reasons for asphalt's much lower initial construction cost. And to prove that economical asphalt surfaces are low in maintenance cost, one need only regard the performance of the pavements at National Airport. Subjected every day to the loadings of commercial aircraft weighing several hundred thousand pounds, National's runways have required only minor repair and sealing during their lifetime.

L.A. INTERNATIONAL AIRPORT

Thirty years ago Los Angeles International Airport was a bean field. Today it is the fourth largest commercial airport in volume of air traffic in the United States. Its airplane movements in 1956 numbered 228,917.

The development of this great air terminal reflects the growth of commercial aviation in our nation. In 1925, the airport boasted only a single 2,200-foot macadam strip. Then in 1938 and 1939 the City of Los Angeles, which owned the field, built two heavy-duty asphalt runways to accommodate increasing traffic. These provided excellent service with practically no maintenance for twelve years. So extensive were the changes and developments that took place in aircraft production and design during this period that additional runways, extensions and improvements to increase load-bearing capacity were undertaken between 1948 and 1951, with most of the pavements built over an emulsified asphalt stabilized base. Since then, periodic strengthening with asphalt and extension of taxiways have been conducted to streamline operations while traffic volumes and aircraft weights continue to rise.

Photo: Spence Air Photos



ATLANTA MUNICIPAL AIRPORT

Handling more than three hundred scheduled airline flights each day, Atlanta Municipal Airport ranks fifth among asphalt airports in volume of plane movements. It also holds a record unique among all commercial airfields: between 12:30 and 1:30 each day, Atlanta conducts the busiest single air hour in the nation. In other words, although other cities have more traffic during a day, Atlanta handles more during that hour than any other city during any other hour.

The airport has four runways, three of which are surfaced

MIAMI INTERNATIONAL AIRPORT *Photo: Fairchild Aerial Surveys*

Photo: Trans-World Airlines

with modern asphalt pavement. In 1956 they served 188,467 planes. Moreover, most of the taxiways and all of the apron area are paved with asphalt.

Municipal airport authorities, in addition to conducting a program of new taxiway construction with asphalt pavement, part of which is now under contract, are planning to request Atlanta taxpayers for approximately $12 million to build a new air terminal building. If plans are carried out, the new terminal would considerably increase the airport's capacity, not only easing the handling of passengers but providing parking space for at least 100 of the largest type planes in use to date.

Atlanta is an excellent asphalt field destined to become one of the world's finest.

MIAMI INTERNATIONAL AIRPORT

Sixth on the list of major asphalt-paved civil airfields is Miami International Airport, the nation's foremost hub for travel to Mexico, South America, Cuba and the West Indies.

Last year over 183,000 planes used its four rugged asphalt-paved runways that have long afforded smooth landings, take-offs and taxiing for the big trans- and inter-continental airliners annually carrying thousands of European, U.S. and Latin American vacationers and visitors to and from our shores.

ALBUQUERQUE AIRPORT

The Albuquerque Airport is known officially as Kirtland Air Force Base. It is open, however, for public transportation, and three commercial airlines make use of its facilities. The airport's control tower reported nearly 179,000 takeoffs and landings in 1956.

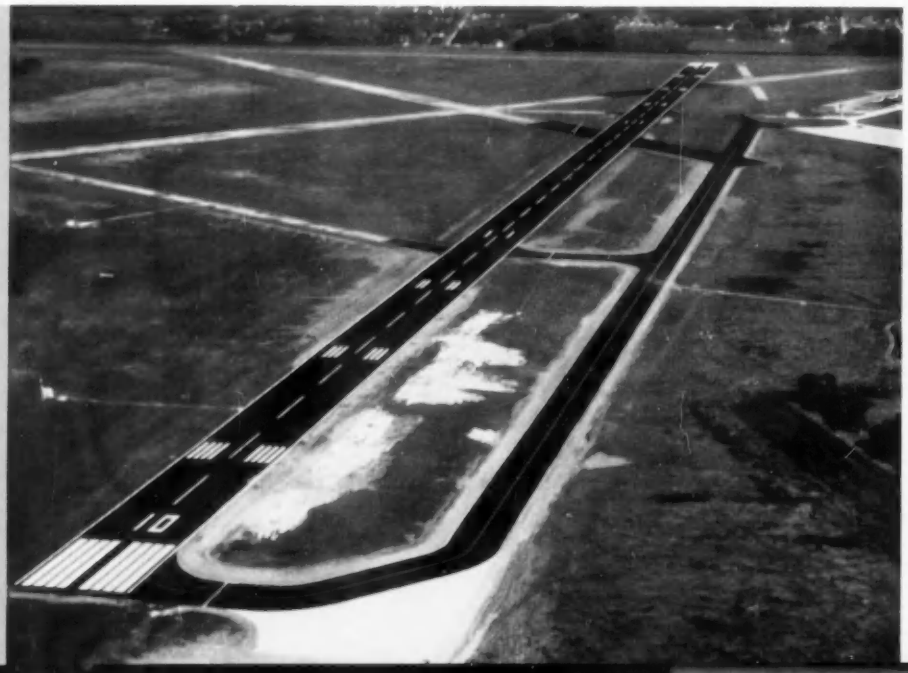
There are five runways at Albuquerque, the newest one, running east-west, having been constructed in 1954 and 1955 by the U.S. Army Corps of Engineers. The entire stretch, with the exception of 500 feet at either end is paved with 4″ of asphalt hot-mix. Total thickness of the pavement structure varies from a minimum of 12″ to a maximum of 17″. Base material is composed of sand and crushed gravel.

Most of the other runway and taxiway pavements were built just prior to and at the beginning of World War II with WPA funds. Except for certain small areas of slab pavement, principally at runway ends and warm-up areas, the construction is all modern asphalt pavement.

RUNWAY RENEWED AT NEW ORLEANS AIRPORT

This striking photo gives a bird's eye view of the east-west runway at New Orleans' Moisant Airport. As part of a five-year, multi-million-dollar modernization plan, engineers for the city's aviation Commission in September 1955 used modern, heavy-duty asphalt pavement to rejuvenate and strengthen the worn-out slab pavement built only eleven years earlier. Note the sharp delineation of pavement markings against the smooth, dark asphalt.

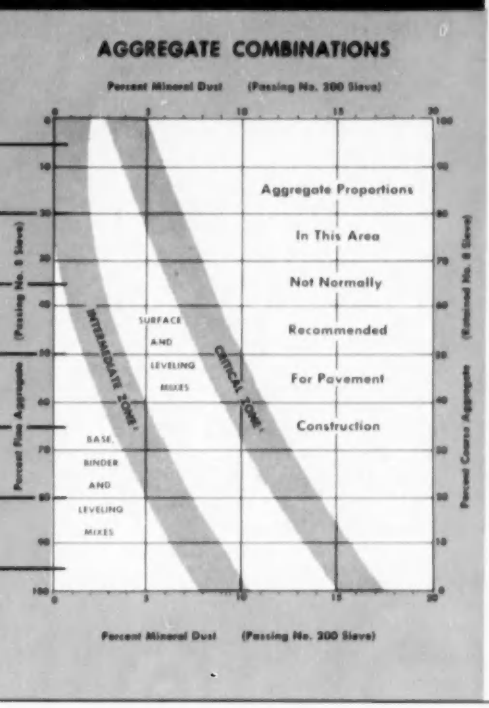
Photo: Geer Studio



CLASSIFICATION OF HOT-MIX ASPHALT PAVING

PAVING MIX DESIGNATION		MAXIMUM SIZE AGGREGATE NORMALLY USED	
Type	DESCRIPTION	SURFACE AND LEVELING MIXES	BASE, BINDER AND LEVELING MIXES
I	MACADAM		2½"
II	OPEN GRADED	⅜"—¾"	¾"—1½"
III	COARSE GRADED	½"—¾"	¾"—1½"
IV	DENSE GRADED	½"—1"	1"—1½"
V	FINE GRADED	½"—⅜"	¾"
VI	STONE SHEET	½"—¾"	¾"
VII	SAND SHEET	⅜"	
VIII	FINE SHEET	No. 4	No. 4

1. *CRITICAL ZONE*—DUST CONTENTS IN THIS REGION SHOULD NOT BE USED WITHOUT A SUBSTANTIAL BACKGROUND OF EXPERIENCE WITH SUCH MIXES AND/OR SUITABLE JUSTIFICATION BY LABORATORY DESIGN TESTS.
2. *INTERMEDIATE ZONE*—DUST CONTENTS IN THIS REGION SOMETIMES USED IN SURFACE AND LEVELING MIXES AS WELL AS IN BASE AND BINDER MIXES.



The Asphalt Institute Codifies Types of Paving Mixes

The Asphalt Institute, already pioneering a reduction in the multiple grades of asphalt cements and emulsions, has raised a clear voice in the Babel of hot-mix paving terminology.

Too long have paving engineers from different sections of the country been groping for a common language when the subject under discussion is hot-mix paving. With a view to sweeping away this artificial barrier to an easier exchange of views in bituminous engineering, the Institute has established a table of eight basic types of asphalt paving mixes.

The chart systematizes types and terminology for practically all proven types of asphalt paving mix ranging from sheet mixes containing no coarse aggregate to the macadam mixes with little or no fine aggregate.

Asphalt paving mixes may be produced from a fairly wide range of aggregate combinations, each having its own particular characteristic and suited to specific design and construction uses. In every case a paving mixture consists of a combination of aggregates uniformly mixed and coated with asphalt cement. The variables which identify the mix by type are the relative amounts of coarse and fine aggregate and mineral dust used.

Naturally, the possible combinations that may be produced from these variables are almost unlimited. The variety of mix types of proven usefulness, however, is severely limited by essential characteristics. Thus, it is only logical that the establishment of a uniform technology for mix types be attempted.

For example, one engineer may speak of the Illinois I-11 Mix and another may speak of Ohio's T-35, Type A Mix, while yet a third is speaking of New Jersey's FA-BC-2 Mix. All three mixes have a common denominator. They are mixed in an asphalt plant and spread in a conventional manner. It is conceivable that three such state mix designs may have identical aggregate grading and asphalt cement requirements, yet three engineers representing these states would have a painful time establishing a common basis of understanding in any discussion of mutual technological problems.

To cleave through this underbrush of misunderstanding, the Institute has devised a system of mix type identification which will be a feature of its new hot-mix construction specifications, now in preparation. The accompanying chart illustrates the basic features of this system.

FUNDAMENTAL MIX TYPES

The fundamental mix types have been identified by name as follows: I—Macadam, II—Open Graded, III—Coarse Graded, IV—Dense Graded, V—Fine Graded, VI—Stone Sheet, VII—Sand Sheet, and VIII—Fine Sheet.

Each mix is designated by specific limits for aggregates retained on and passing the No. 8 sieve. Similarly, the chart

also indicates the maximum size of aggregate normally used for a given mix designation, and the limiting amounts of mineral dust generally found satisfactory for base construction, binder or leveling course, and surface mix.

Primary consideration is given to the proportions of coarse aggregate (retained on the No. 8 sieve) and the fine aggregate (passing the No. 8 sieve). Important, also, is the proportion of mineral dust (passing the No. 200 sieve), and the normal limits for this proportion are indicated by a shaded band on the chart. The band is used to denote flexible rather than fixed numerical limits.

Normally, surface course mixes will contain relatively more mineral dust than either base or binder mixes. Conversely, base mixes will contain a minimal fraction of dust. An examination of the chart will show this relationship.

As a general rule, the base and binder course mixes will fall on the left side of the shaded band, with the surface course mixes being found to the right. Leveling mixes may fall into either area.

It will be noted that a second shaded band represents the Critical Zone, defining the extreme limits of good construction practice. Aggregate proportions in and beyond this banded zone are not normally recommended for pavement construction unless proved through lengthy experience.

In evaluating data for compiling its classification chart The Asphalt Institute has satisfied itself that the terms and limits set forth in the system are in general agreement with construction practices in all 48 states, although they may be at variance with some local practices. None of these variances are sufficiently serious, in the opinion of Institute engineers, to constitute discrepancy.

ADVANTAGES OF UNIFORM TERMINOLOGY

The advantages of establishing a common code and terminology in asphalt paving are self-evident. The technology of bituminous paving is advancing steadily on a broad front and the need for a universal medium of communication has long been recognized. For instance, The Asphalt Institute has an active interest in promoting a more comprehensive program of study in asphalt engineering in schools and universities. Obviously, it will be to the advantage of the engineering profession and the men charged with preparing the curriculum at engineering colleges if a common and universal text-book language can be established. As long as bituminous engineers talk in obscure symbols and within a local frame of reference, the engineering instructor must be forgiven if he fails to share the Institute's enthusiasm for the subject.

The Institute's classification formula is not intended to deny the existence of sub-types which have a rightful place in the table of specifications. In fact, the Institute's forthcoming construction specifications will include many sub-types, related to the general system but establishing the more precise limitations required for close control of high-type asphalt paving mixes. The basic purpose is to speed the day when engineers from different states can meet to discuss mutual problems in highway construction without first negotiating a series of intellectual hurdles involved in transposing terms.

First announcement of the proposed classification chart was made by John M. Griffith, Institute Engineer of Research, in a paper delivered during a technical session at the recent Chicago Road Show of the American Road Builders' Association.

ASPHALT, Shoulder to ON

To the few hundred Navajo Indians at Tesuque pueblo, just north of Santa Fe, the coming and going of the white man must be something of an imponderable mystery.

Living as he has always lived beneath the unchanging blue New Mexico sky, the Navajo has watched wheeled traffic on the old Taos road below grow from the lonely creak of a passing wagon to the power purr of the motor age.

But the more things change the more they revert to type. And today, the Navajo sits before his adobe wall and follows the passage of an occasional car as the surburban Tesuque housewife returns from a downtown shopping expedition. The muffled surge of racing motors comes distantly from the west where the new double-barreled Tesuque by-pass hustles the tourist along the road to Taos, or the nuclear scientist back to Los Alamos in the foothills of the distant Sangre de Cristo range.

The by-pass, extending nearly five miles from the northern limits of Santa Fe to a reunion with the old Taos road beyond Tesuque, is asphalt-paved, of course. There are less than fifty miles of slab pavement in the entire state of New Mexico and none has been built in the last twenty years. But the Tesuque by-pass is more than just an outstanding example of modern asphalt paving. It is asphalt from end-to-end and shoulder-to-shoulder.

Its two 24-foot roadways are asphalt-paved. The road boasts a six-foot asphalt-paved median set off between asphaltic concrete curbs. The eight-foot shoulders are asphalt, and asphalt curbs and spillways have been constructed on

to Shoulder

THE NAVAJO TRAIL

moderate and steep grades at the shoulder edge to control slope erosion.

TOP QUALITY CONSTRUCTION

The main pavement design represents top quality construction, suitable for typical high-density traffic volume in this semi-arid country. The flexible base ranges from 8″ to 12″ in thickness topped with a prime coat. Both hot-mix binder course and finished heavy-duty hot-mix surface are 1½″ thick.

The shoulders are surfaced with 1½″ of asphaltic hot-mix and sealed with a single asphalt surface treatment and coarse gravel to provide demarkation between the travel lanes and the shoulder. The median strip consists of 6″ of asphaltic hot-mix laid in a single course and sealed in the same manner as the shoulders.

The new project diverts a steadily rising volume of traffic from the narrow and winding old canyon road which threads its way through the fashionable suburban town of Tesuque. Until the arrival of the atomic age this was the "old Taos road," carrying occasional traffic over the mesa to the rugged mountains to the north. Then came the establishment of the busy laboratory town at Los Alamos, and then Hiroshima.

The rapid growth of one of the nation's first "nuclear communities" doubled and tripled the volume of traffic on the old road. By 1955 traffic had approached 5,000 vehicles per day, many of them massive trucks hauling equipment and supplies to the laboratory town. U.S. 64 became one of the state's busier traffic arteries, demanding total rehabilitation.

NEW ROAD A SHOWPIECE

Logically, the asphalt-wise State Highway Department determined to make the new road a showpiece of modern asphalt construction. Ultimately, the entire route from Santa Fe to Espanola, a distance of 26 miles, will be double-barreled to the same high engineering standards.

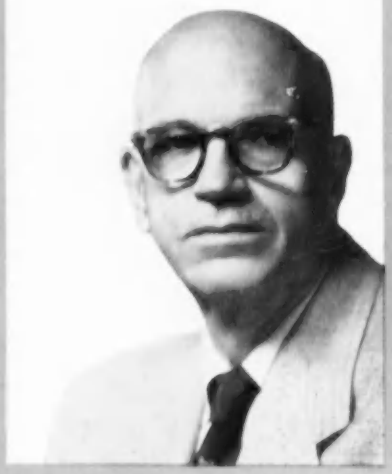
As Mr. L. D. Wilson, Chief Highway Engineer, declared after completion of the project:

"The major portion of our highway construction program will be of the heavy-duty asphalt type because it utilizes local materials and is the most economical. By so doing we can give the public the most miles of satisfactory pavement for the least initial outlay."

Mr. Theodore R. Brown of Albuquerque, contractor on the project, had his own reasons for being satisfied with the new road:

"The use of asphalt pavement enables the contractor to lengthen his construction season and simplifies the handling of traffic during construction."

Backed by this type of engineering conviction and construction enthusiasm, one of the nation's finest ribbons of smooth-riding asphalt pavement rises out of the historic city of Santa Fe and sweeps north through the cottonwood and pinon patches—proving there is something as new as tomorrow under the braising sun of New Mexico.



DON G. EVANS
District Engineer at Los Angeles

Don G. Evans, Asphalt Institute District Engineer operating within the Institute's Pacific Coast Division, serves Southern California and Arizona from offices at 1709 West Eighth Street, Los Angeles. He joined the Institute in June 1955.

Mr. Evans was graduated in 1911 from Rose Polytechnic Institute, Terre Haute, Indiana, with a degree in Civil Engineering. After nine years as a mining engineer in Central America and the western states, he spent seven years with the U. S. Bureau of Public Roads locating and developing forest and park roads in Arizona and New Mexico, including the Grand Canyon highway system.

In 1929, Mr. Evans joined the California Division of Highways where he served in various capacities until his retirement two years ago. During four wartime years he served with the Army Engineer Corps as highway engineer and later as chief of military construction in eight western states. As State Highway Construction Engineer with the California Division of Highways for the four years preceding acceptance of his present post with The Asphalt Institute, his major interest was the standardization of construction practice with respect to asphalt plants and paving in cooperation with the California State Laboratory.

Mr. Evans is a Registered Professional Engineer in California and a member of the American Society of Military Engineers.

U. of California Announces Summer Graduate Program in Asphalt Paving Technology

For college engineering instructors interested in advanced training in Asphalt Paving Technology, the Institute of Transportation and Traffic Engineering, University of California, at Berkeley, is offering an eight-week summer graduate program, June 17 to August 9, 1957. The program includes courses in Advanced Study of Asphalts and Asphaltic Mixtures, and Analysis and Structural Design of Pavements. Other special subjects will be covered in seminars and by guest lecturers. Substantial grants-in-aid, made possible through a grant to the University by The Asphalt Institute, will be awarded to selected applicants.

COLONEL EARL B. LOCKRIDGE

As road builders from all parts of the world converged on Chicago for the opening of the ARBA Road Show in January, many were shocked and saddened by the news that Colonel Earl B. Lockridge had passed away suddenly on Sunday, January 27. Col. Lockridge had been Area Engineer at The Asphalt Institute's Indianapolis office since July 1, 1954, following a long and distinguished career in public service, notably with the Indiana State Highway Department. By his death, the engineering profession and the road-building industry he served so well have lost a devoted friend and gallant gentleman.

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Printed in the U.S.A.